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(54) Abstract Title

Electronic shelf label and shopping system

(57) A self service shopping system includes electronic shelf labels 114 communicating with a central computer 110 and portable shopping terminals 116 in short range communication with the electronic shelf labels. A customer records purchases by activating the terminal in the vicinity of the shelf label. Identification data may be sent from the terminal to the shelf label to be relayed to the central computer to record a purchase. Alternatively data can be sent from the shelf label to the terminal to record a purchase. A customer service station 118 and a cashier station 120 may also be provided. The communication links may be by radio or optical means.

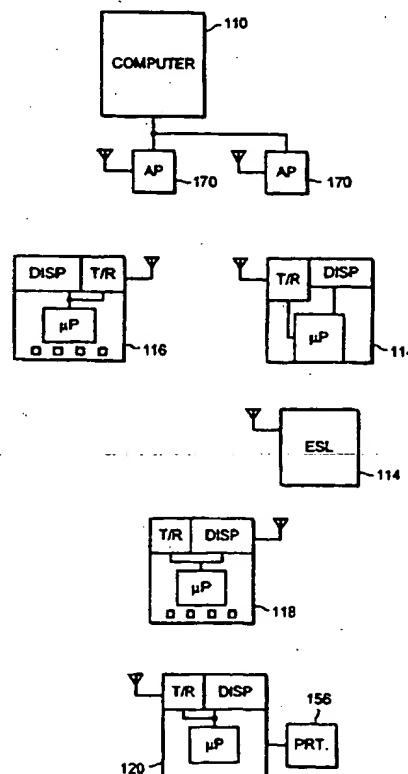


FIG. 1

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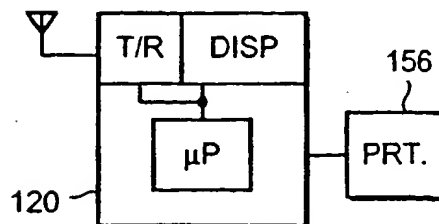
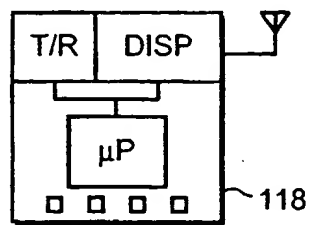
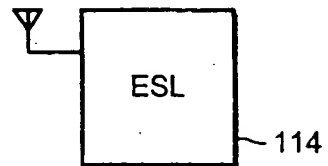
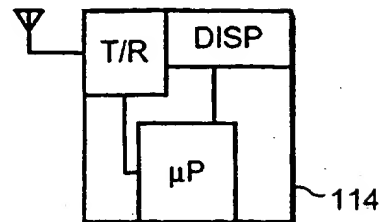
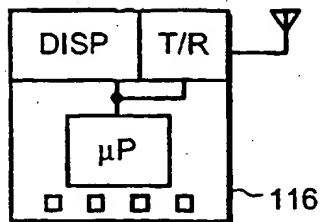
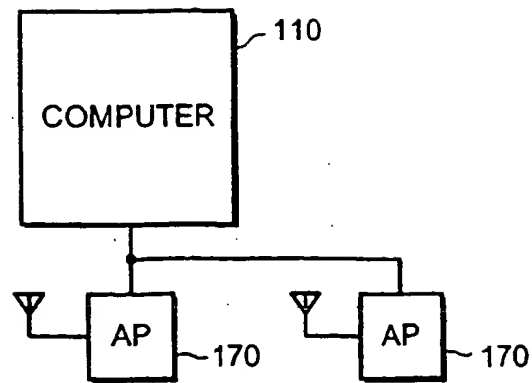
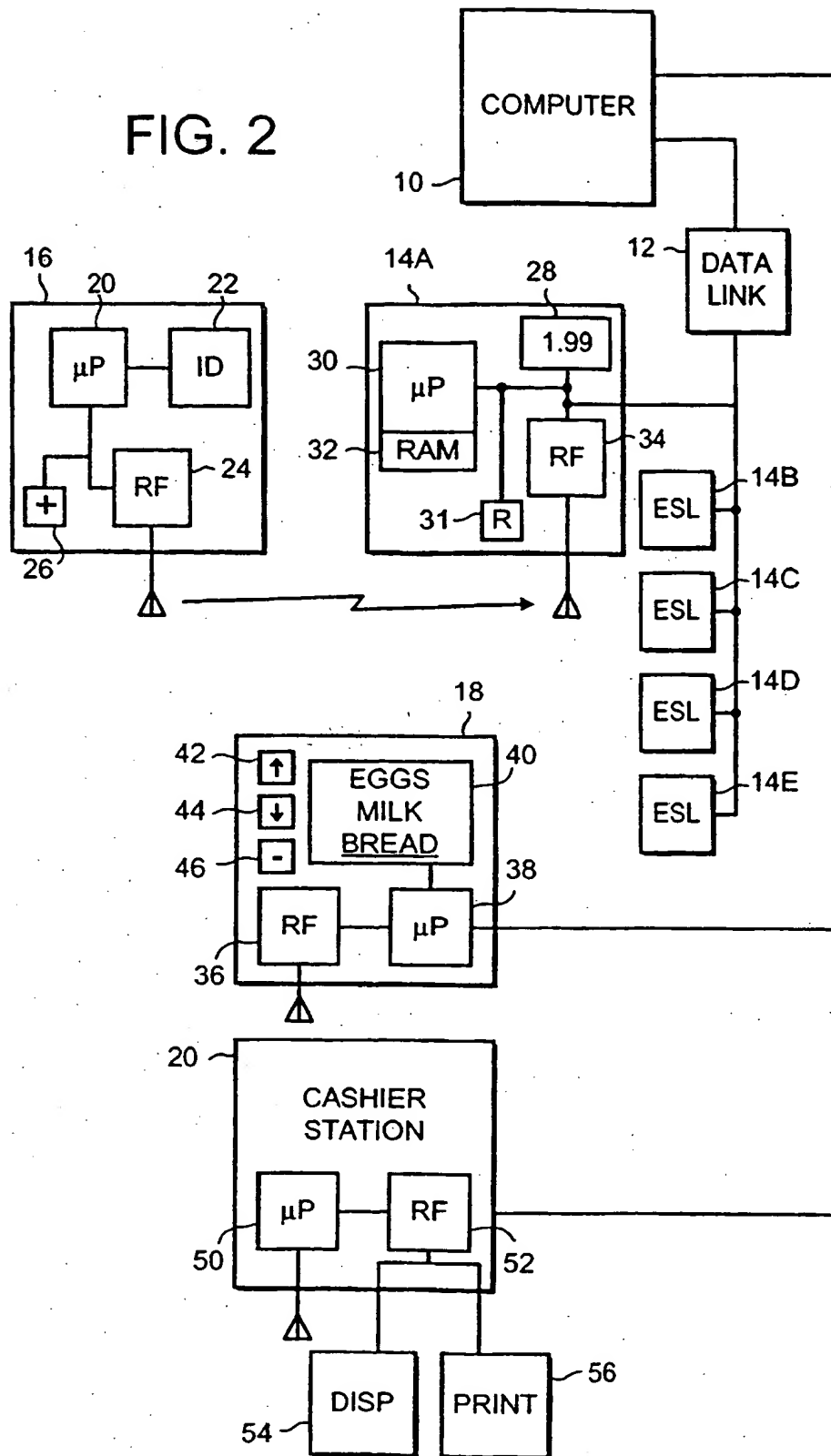


FIG. 1

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FIG. 2



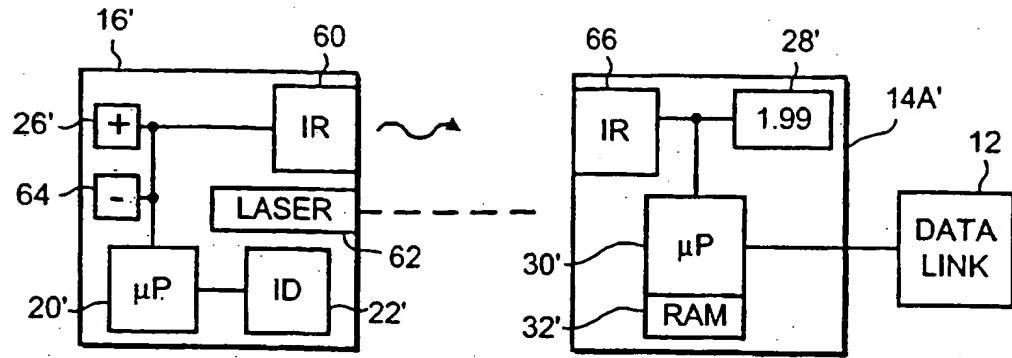


FIG. 3

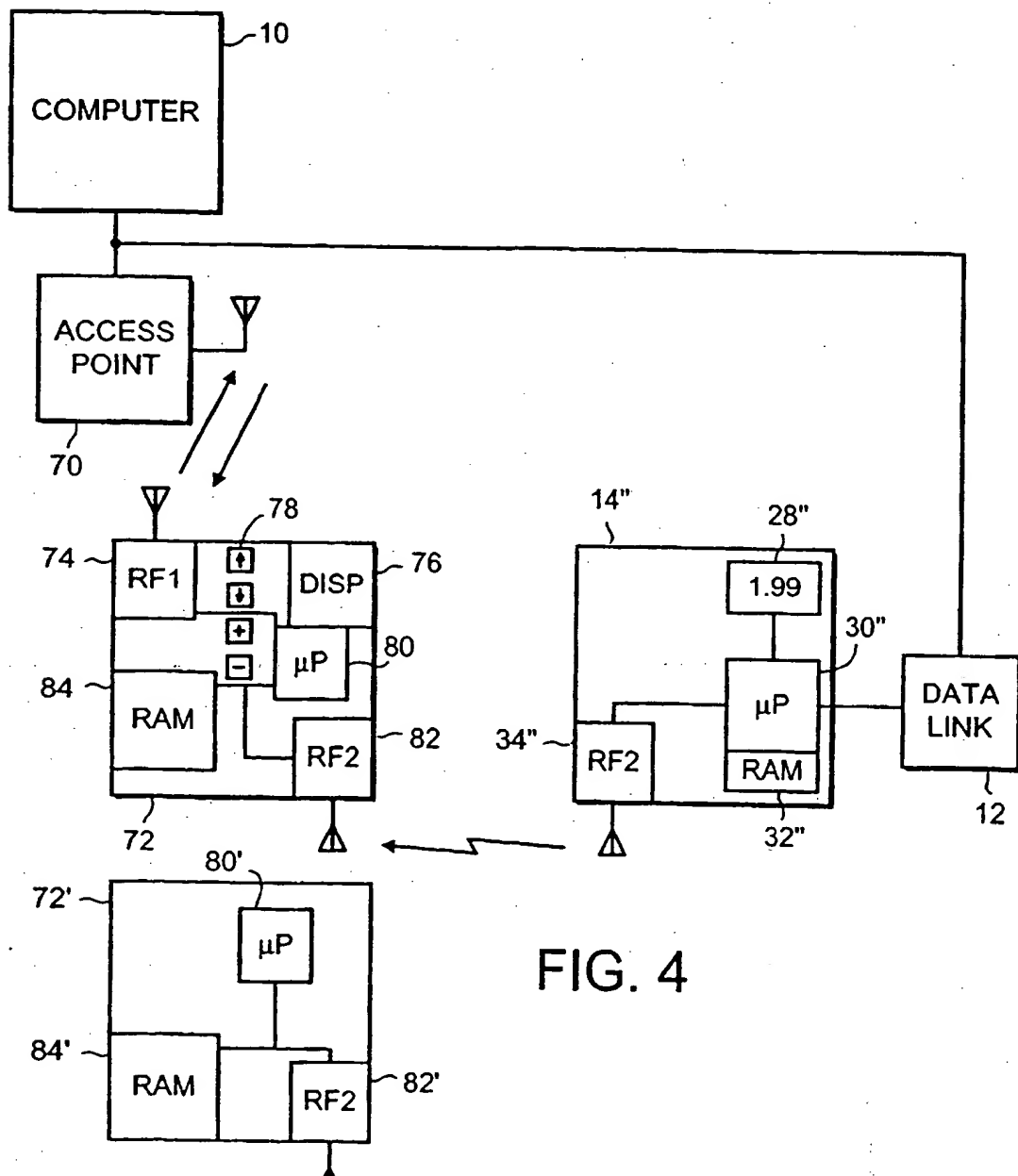


FIG. 4

ELECTRONIC SHELF LABEL AND SHOPPING SYSTEM

SPECIFICATION

BACKGROUND OF THE INVENTION

This invention relates to electronic, self-service shopping systems, one of which is described in U.S. Patent 5,468,942. In accordance with known systems, portable shopping terminals are provided for use by a customer to optically scan the bar code on products to be purchased. The terminal thus acquires a list of items to be purchased as the items are selected, thus eliminating the need for customer check-out when leaving the store. As disclosed in the referenced patent, a dispenser is provided for holding a plurality of customer terminal devices which can be checked out by a customer and used by the customer while shopping to electronically record items to be purchased.

In a system currently being marketed by Symbol Technologies, Inc. assignee of the present invention, there is provided a self-service shopping system, having portable customer terminals which are connected by a wireless computer network to a central computer. The customer terminals are in radio data communications with the computer to obtain product information therefrom and to transmit customer purchase data thereto.

While the existing system provides improved efficiency and reduces cost over a manual check-out system, the existing customer terminals which include an optical

scanner and sophisticated network radio are expensive to manufacture. It is therefore desirable to provide an improved system using less expensive customer terminals.

Another store automation feature is the electronic shelf label system, wherein shelf labels identifying the price and other data concerning products offered for sale are electronically addressed by a central computer to display the current price of the item. In accordance with such shelf label systems, the shelf labels, either individually or in groups, are in communication with the central computer over a datalink, which may be wired, radio or optical.

An object of the present invention is to provide a system wherein portable shopping terminals work in conjunction with electronic shelf labels, thereby to provide maximum automation for a retail store, while at the same time, providing economy in construction of portable shopping systems.

SUMMARY OF THE INVENTION

In accordance with the present invention, a self-service shopping system includes a plurality of electronic shelf labels having a communications module for providing data communications with a central computer for receiving pricing information therefrom and for providing a short-range communications. A portable shopping terminal is provided for receiving short range communications of data representing articles to be purchased from the electronic shelf labels in response to activation of the portable terminal by a customer.

The self-service shopping system can further include a memory in the portable shopping terminal for storing the received data representing articles to be purchased. The portable shopping terminal may include a display for displaying data representing a list of articles, and a key for deleting data representing articles from the
5 list. In one arrangement the portable shopping terminal communicates with the central computer over a radio data communications link. The short-range communications module for communicating between the portable terminal and the shelf label may be a radio or optical module.

In a preferred arrangement the portable shopping terminal communicates
10 with the central computer using a wireless data network and a first, high data rate communications protocol, and the electronic shelf label communicates with the central computer using the wireless data network and a second, low data rate communications protocol.

In accordance with another aspect of the invention, there is provided a
15 method for recording purchases by a customer using a self-service terminal. The method includes associating electronic shelf labels with items to be purchased, providing data communications from the shelf labels to the self-service terminal, the data representing items to be purchased and accumulating a list of items represented by data communicated to the self-service terminal.

20 The method can further comprise communicating data representing items to be purchased to a central computer from the terminal wherein the list of items is accumulated in the central computer. Alternatively, a list of items can be accumulated in

a memory in the self-service terminal and displayed to the customer on a display included in the terminal.

In accordance with another aspect of the present invention, there is provided a self-service shopping system which includes a data communication network having a central computer and a plurality of electronic shelf labels, each communicating with the central computer and receiving price representative data therefrom. There is further provided a plurality of self-service shopping terminals for communicating purchase data to the shelf labels in response to activation of the terminal by a customer. The shelf labels relay the purchase data to the central computer and the central computer records purchases by the customer in response to the purchase data.

The self-service shopping terminals may communicate purchase data comprising shopping terminal identification data. The communication can be by short-range radio communication or by optical communication, such as infrared communication.

In accordance with another aspect of the invention, there is provided a method for recording purchases by a customer using a self-service terminal. The method includes associating electronic shelf labels with items to be purchased and providing data communication from shopping terminals to the electronic shelf labels representing purchases by a customer associated with the shopping terminal of items associated with the shelf labels. The purchase representative data is communicated from the shelf labels to a central computer and the central computer accumulates a list of purchases associated with a customer.

In a preferred practice of the method of the invention, the data communication from the shopping terminals to the shelf labels comprises either short-range radio communication or optical communication such as infrared communication.

5 In accordance with another aspect of the invention, there is provided an item return station for use in a self-service shopping system, wherein a shopper is associated with a shopping terminal for entering data associated with items to be purchased. The item return station includes a communication module for receiving terminal identification data from the terminal, a display for displaying an itemized list of
10 purchases entered using the shopping terminal, and data entry means for designating items to be deleted from the list.

In accordance with a further aspect of the invention, there is provided an electronic shelf label for use in conjunction with an electronic self-service shopping system. The electronic shelf label includes a shelf label memory for storing price data, a
15 shelf label display for displaying the price data stored in the memory, and a data communication module for communicating with a central computer, and for providing short range communications with a self-service shopping terminal.

In accordance with a further aspect of the present invention, there is provided an apparatus usable in a self-service shopping system having portable terminals
20 for use by customer to generate a record of items to be purchased. The apparatus is for recording deletion of articles from the record and includes a return station having a display and a communication unit for receiving data from the portable terminal. The

return station is in data communication with a central computer maintaining the record of items and in data communication with the portable terminal. The return station is arranged to receive identification data from the portable terminal and to receive a record of items from the central computer, to display the record on the display and to receive
5 article deletion commands from the customer.

The return station may include keys where the keys receive the article deletion commands, or alternatively, the return station can receive article deletion commands as data communications from the portable terminal.

In accordance with a further aspect of the invention there is provided a
10 system for distributing product information for a plurality of items which are available for customer selection. The system includes a central computer having access to a database of product information for each of the plurality of items, and having a communications interface for transmitting at least a portion of the product information to a remote address. There are further provided a plurality of electronic shelf labels for displaying at least a
15 portion of the product information for at least one associated item available for selection by a customer each of the electronic shelf labels having a unique address and including a communications interface for receiving the product information. There is further provided at least one terminal device, arranged for data communications with the electronic shelf labels, for use by a customer for generating an itemized list of items
20 selected by the customer, whereby the itemized list is generated and stored in a memory.

The system may include a checkout system for reading the itemized list from the memory and receiving payment. The list may be stored in a memory on the

terminal or may be communicated to the central computer for storage in memory associated with the central computer.

For a better understanding of the present invention, together with other and further objects, reference is made to the following description, taken in conjunction
5 with the accompanying drawings and its scope will be appointed out in the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a block diagram of an automated retail system having electronic shelf labels and portable shopping terminals in accordance with the present
10 invention.

Figure 2 is a block diagram illustrating an alternate embodiment of an automated retail system in accordance with the present invention.

Figure 3 is a block diagram illustrating alternate embodiments of a portable shopping terminal and shelf label, for use in the Figure 2 system.

15 Figure 4 is a block diagram of an alternate embodiment of an electronic shopping system in accordance with the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to Figure 1, there is shown an embodiment of an automated shopping system according to the present invention. The system includes a central

computer 110, which is connected by a local area wired network to a plurality of radio data communications access points 170. The wired and wireless data communications may be in accordance with those used in the Spectrum 24 System available from Symbol Technologies, Inc., assignee of this application.

5 The Figure 1 system includes a plurality of electronic shelf labels 114, each of which is arranged to be mounted in the vicinity of a product offered for sale. Electronic shelf labels 114 include a transmitter/receiver module a display for displaying price information to customers and a processor for controlling the transmitter/receiver module and the display. The electronic shelf labels are arranged to receive price
10 information data from computer 110 via the wireless data network, as will be further described. In addition, the electronic shelf labels are arranged to communicate with portable shopping terminals 116, to communicate item and/or pricing data to the portable shopping terminals.

 Portable shopping terminals 116 are similar to the terminals used in the
15 portable shopping system marketed by Symbol Technologies without the usual optical scanner, except that the terminals 116, in addition to providing data communications with computer 110 via the wireless network, are arranged to provide short range communications with shelf labels 114.

 The system of Figure 1 further includes a customer service station 118 and
20 a cashier station 120, each of which may communicate over the wireless network with computer 110 or may be connected to computer 110 over a wired network.

The Figure 1 system includes, in a preferred arrangement, three distinct data communications. First, there is wireless data communications between portable shopping terminals 116 and computer 110, which may use a high data rate wireless protocol, such as the IEEE 802.11 protocol provided by the Spectrum 24 system.

5 Preferably all data communications between the access points 170 and terminal 116 include acknowledgments. This communication is provided through network access points 170, which may also provide data communications using the same high data rate protocol to other system installations, such as cashier stations 120 or customers service station 118.

10 A second data communications link is between computer 110 and electronic shelf labels 114. This data link is provided to update pricing information displayed by shelf labels 114, and therefore does not require high data rate communications. Accordingly, the access points 170 may be arranged to send and receive data communications with shelf labels 114 using a second, low data rate protocol.

15 This second protocol may be provided by broadcasting an interrupt signal to mobile units, such as shopping terminals 116 and stations 118, 120, which provides an interrupt period during which data communications using the first protocol are discontinued to allow communications using the second protocol. The access points then broadcast low data rate messages addressed to individual shelf labels and containing updated pricing data.

20 The shelf labels, upon receipt of such messages, update the stored pricing information and send an acknowledgment signal to the access point.

The use of a second, low data rate protocol enables simplification of the radio frequency and processor components used in the shelf labels, thereby reducing the cost of the shelf labels 114.

The second, low data rate protocol is additionally used for the third radio
5 communications between the portable shopping terminals 116 and the shelf labels 114 for communications data relating to items being selected for purchase by a customer. In the case of customer selection of an item, the shopping terminal 116 is held close to shelf label 114 and a selection button is depressed by the customer. The shopping terminal then sends a request signal to the shelf label using the second protocol and a very low
10 power output, to provide shelf label selection using proximity of the terminal to the self label. The shelf label responds with a corresponding low power level, low data rate, short range data transmission that communicates identification of the corresponding item and/or price data to the terminal. The terminal may maintain a list of data corresponding to items selected for purchase. This item representative data may also be communicated
15 from terminal 116 to central computer 110 using the first high data rate protocol, either on an item-by-item basis, or in response to a poll from computer 110 as list update data.

Shopping terminal 116 may include a display for displaying a list of items previously selected by the customer, along with the total price of the goods selected. The customer can highlight and delete items from the list using terminal buttons, and return
20 the deleted items to the shelf or to a collection basket. Alternately, if the shopping terminal is not provided with a display, the customer may review the list of items at a service terminal 118, which is arranged to respond to a signal from terminal 116 to

retrieve the customer's list from central computer 110, using the first protocol. The customer can elect to delete items at station 118 prior to proceeding to the cashier's station 120. At the cashier station 120 the customer pays for the items on the list and is provided with a printed receipt.

5 Those skilled in the art will recognize that as an alternate to using radio signals, some of the communications involved may be conveniently provided by other communications media, such as optical links, wired network connections, wired connections through plug in receptacles, magnetic coupling or RFID devices. In particular, the electronic shelf labels may be provided with optical transmitters and
10 receivers for communicating to and from central computer 110 using light or other optical radiation, such as infrared. Likewise a short range optical communications link may be provided for communications in both directions between shelf labels 114 and terminal 116, and/or for communications between terminal 116 and service terminal 118 and cashiers station 120. Further, magnetic coupling signals may be used to provide such
15 short range communications. Data communications to or from terminal 116 at service terminal 116 or cashier station 120 can be provided using electrical contacts at a plug-in receptacle. Shelf labels 114 may be connected to computer 110 through wired networks or through a combination of wired and wireless networks, for example connecting many shelf labels to a single wireless node in the system. To provide low cost, the short range
20 communication between terminal 116 and shelf label 114 may be provided by arranging the transmitter in shelf label 114 as a radio frequency identification tag providing a short range, product identifying signal to terminal 116.

Referring to Figure 2, there is shown a block diagram of an alternate self-service shopping system according to a further embodiment of the present invention. The system includes an electronic shelf label arrangement wherein a central computer 10 is linked to a plurality of enhanced electronic shelf labels 14A, 14B, 14C, etc. over a datalink 12. It will be understood that datalink 12 may include a radio data network, a wired network, an infrared data network or a combination of networks, such as a plurality of nodes linked to computer 10 over a radio link and linked to individual shelf labels 14 over a localized wired network. Each shelf label 14 has a unique address accessible over the data link 12. A typical store may have a thousand or more shelf labels 14 corresponding to individual items to be purchased.

As typically understood in the art, shelf labels include a data memory, such as random access memory 32 (RAM), which can be written to by a computer to provide price data corresponding to the items associated with the shelf label. Known shelf labels also include a display 28 for indicating the item price to a customer. Such shelf labels may include an inexpensive microprocessor or single chip computer 30 which incorporates RAM 32 and provides an interface for a more sophisticated level of data communication over the datalink. The microprocessor can be programmed to respond to a "reset" button 31 to start up the processor and to clear the display until price data is received over the data link. The display may include a "no data" indication for the customer. According to the present invention, shelf labels 14 include in addition to a price RAM 32, price display 28, and optional microprocessor 30, a short range RF or

other communication module 34 for providing short range radio or other data communication with a portable shopping terminal 16.

Shopping terminal 16 is arranged to be carried by a shopper for purposes of recording a list of items to be purchased. Portable shopping terminal 16 is provided with an electronically stored identification number, which may be in the form of a programmed read only memory 22. The Identification number of terminal 16 may be permanently associated with a single customer, or may be associated with a customer when a customer enters a store and checks-out a terminal. In addition, terminal 16 includes a short-range radio module 24 for providing data communication to shelf label 14 and other units of the system. A microprocessor 20 may be provided for formatting the data communication. Button 26 activates terminal 16 to send a data radio signal to shelf label 14 for purposes of having a shopper add an item to his or her list of selected items. Since the radio communication between RF module 24 and RF module 34 is very short range, the portable shopping terminal 16 must be held close to the shelf label 14 to effect communication, for example, less than six inches. Very short range radio modules, such as those used in connection with radio frequency identification tags, used, for example, to control unlocking of a door are suitable for use in the present invention.

Successful communication can be indicated by providing an acknowledgment signal from the shelf label to the shopping terminal, causing a green LED to flash or an audible beep to sound on the terminal. Alternately, the shelf label can emit a similar signal when it has received the communication, eliminating the need for reverse radio transmission.

The data signal from the terminal 16 to shelf label 14 need include only the terminal identification. When a customer wishes to purchase multiple identical items, the activation button 26 can be repeatedly pressed.

When shelf label 14 receives a data signal from terminal 16, which
5 includes the terminal identification number, the shelf label sends a message to computer 10 over datalink 12, which identifies the shopping terminal 16 and the purchased item associated with shelf label 14. Computer 10 maintains a list of purchases selected by the customer associated with terminal 16, and updates the list with each purchase-representing signal from one of shelf labels 14.

10 The self-service shopping system of Figure 2 preferably includes a customer service return terminal 18. Terminal 18 enables the customer to review the list of purchases recorded in computer 10 before reaching the cashier's station 20. Customer service terminal 18 includes an RF module 36 for receiving an identification data radio signal from portable customer terminal 16. Microprocessor 38 in service terminal 18
15 communicates with computer 10 over datalink 12 or over a separate wired, radio or infrared datalink to retrieve the list of items associated with terminal 16. The list is then displayed on display 40. Service terminal 18 includes display scroll buttons 42, 44 by which a user can scan the entire list of items and also view, e.g., the total price of the items to be purchased. In the event the customer wishes, upon review, to delete
20 purchases on the list, activation of "minus" button 46, when an item is highlighted will delete the highlighted item from the list and send an appropriate data signal to computer

10. A bin is appropriately provided adjacent service terminal 18 for return of deleted items.

A cashier station 20 is provided for payment by the customers. Since the customer has already entered purchases on a list in computer 10, it is normally unnecessary for the cashier to check-out all items purchased. Cashier station 20 includes an RF module which receives the identification data signal from terminal 16 and causes microprocessor 52 to call up the corresponding purchase list from computer 10. The list can, if desired, be displayed on cashier display 54. The cashier can record cash payment or a credit card charge in the normal manner and cause an itemized receipt to be printed on printer 56. Alternately the cashier station 20 may be a self service terminal for receiving credit card or debit card payment.

Naturally, a customer may be selected for full itemized check-out on a random basis, or by intelligent selection based on the itemized list.

One advantage of the present invention is that shopping terminals 16 are simple and inexpensive. Accordingly, these terminals can be provided to regular customers on a permanent basis or supplied from a dispensing rack for a single shopping session. The size and weight of the terminals can also be reduced, so that a terminal might be as compact, e.g., as a small calculator. As compared to prior terminals, neither a bar-code scanner, a complex radio nor a display are required to be provided on shopping terminal 16, although such items may be optionally provided.

Figure 3 shows an alternate portable shopping terminal 16' and corresponding electronic shelf label 14A' in accordance with the invention. Terminal 16'

is substantially the same as terminal 16, except that in place of RF module 24, there is provided an optical data communications module 60, such as an infrared module, for example. The corresponding shelf label 14A' has its RF module replaced with an infrared module 66. By providing emitters and detectors on both terminal 16' and shelf label 14A, two-way data communication can be provided, but only one-way communication is needed, as described above, if the shelf label emits an audible or visible acknowledgment. Terminal 16' is advantageously provided with a laser 62 or other visible beam emitter to facilitate aiming the terminal 16' at shelf label 14A'. An incidental additional feature shown on terminal 16' is a "minus" button 64 which can be used to enable a customer to return an item to the shelf and delete the item by communication with the shelf label 14A. It will be recognized that this feature can also be provided on the RF terminal 16.

It will be recognized, as noted above, that a wide variety of communications media can be substituted for the radio link of Figure 2 or the IR link of Figure 3 and that similar or alternate communications, including plug-in wired sockets may be used for the customer service terminal or the cashier terminal.

While the system described with respect to Figures 2 and 3 provide communication of a shopping terminal identification to a shelf label, and relay of data from the shelf label to a central computer by datalink 12, whereby the central computer compiles a list of items to be purchased, the system shown in Figure 4, like the system of Figure 1, uses the short-range datalink, either radio, optical or other, to communicate items to be purchased and their corresponding item identification from the shelf label 14A" to a portable shopping terminal 72. In accordance with this arrangement of the

present invention, either a memory, such as RAM 84 in the portable shopping terminal 72 will store a list of items to be purchased or alternatively, terminal 72 will communicate the items to be purchased over a radio datalink, using radio module 74 to an access point 70 of central computer 10, whereby the record of items to be purchased by the customer using portable shopping terminal 72 can be maintain in a memory of the central computer instead of in the portable shopping terminal 72, or in addition to maintaining the record in the portable shopping terminal 72.

In accordance with the arrangement of the invention as shown in Figure 3, pricing data is provided to a shelf label 14A" over a datalink 12 from central computer 10. The portable shelf label includes a microprocessor 30", a RAM 32", for storing data related to the item which corresponds to the shelf label, and display 28" for displaying information, for example, the price of the item. Shelf label 14A" includes a communications module, such as a radio frequency module 34" for providing short-range communication to a portable shopping terminal 72 used by a customer. Portable shopping terminal 72 includes a short-range radio communication module 82 for communicating with shelf label 14A". It will be recognized by those skilled in the art, that alternatively, the short-range communication may be provided by optical or other communications, as described above.

In the arrangement of Figure 3, item-related data is communicated from the electronic shelf label 14A" to the portable shopping terminal 72, when portable shopping terminal 72 is placed in proximity to shelf label 14A" and activated by depressing the plus button by the customer. The data corresponding to the item to be

purchased is received by radio frequency module 82 in portable shopping terminal 72 and under the control of microprocessor 80 stored in RAM 84. Microprocessor 80 causes display 76 to exhibit data representing the item communicated from shelf label 14A", including the price thereof. In the event a customer decides to delete an item from the list of items to be purchased, scrolling buttons and minus buttons included in keys 78 thereon can be used to scroll to the item to be deleted and delete the item from the list.

Portable shopping terminal 72 is designed to provide radio data communication via access point 70 to the central computer 10. This radio data communication can be, for example, by means of a local area radio network, such as the Spectrum 24 system which is available from the assignee of the present application. The list of items to be purchased can be transferred from the portable shopping terminal 72 as items are listed or alternatively, an updated list may be periodically provided to the central computer. In the event that an item is deleted by the customer from the list, this data is also transmitted to central computer to be deleted from the list maintained therein. The portable shopping terminal may maintain a list in addition to the list maintained in the central computer. By communication with the central computer, it is possible for the central computer to provide the itemized list to the cashier for purposes of customer payment at the end of the shopping excursion. In the event no communication is provided to a central computer, as in simplified terminal 72', the list can be maintained in RAM 84' and communicated to a check-out station using RF module 82 or other communications, such as a plug-in docking station. The provision of a display on terminal 72' is optional. Where a display is not provided, portable shopping terminal 72'

can communicate with a customer service station by radio or plug-in to provide the customer with a list in a manner similar to that described with respect to return station 18 of Figure 2.

While there have been described what are believed to be the preferred
5 embodiments of the present invention, those skilled in the art will recognize that other and further modifications may be made thereto without departing from the spirit of the present invention and it is intended to claim all such changes and modifications as fall within the true scope of the invention.

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WE CLAIM:

1 1. A self-service shopping system comprising a plurality of electronic
2 shelf labels, each having a communications module for providing data communication
3 with a central computer for receiving pricing information therefrom, and for providing
4 short-range data communications, and a control unit for supplying data to said
5 communications module, and a portable shopping terminal for receiving short range
6 communications of data representing articles to be purchased from said electronic shelf
7 label in response to activation of said portable terminal by a customer.

1 2. A self-service shopping system as specified in claim 1 wherein said
2 portable shopping terminal further includes a memory for storing said received data
3 presenting articles to be purchased.

1 3. A self-service shopping system as specified in claim 1 wherein said
2 portable shopping terminal further includes a display for displaying said data representing
3 articles and a key for deleting data representing articles from said memory.

 4. A self-service system as specified in claim 1 wherein said portable
shopping terminal further communicates with said central computer over a radio data
communications network.

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1 5. A self-service shopping system as specified in claim 1 wherein said
2 short range communications comprises radio communications.

1 6. A self-service shopping system as specified in claim 1 wherein said
2 short range communications comprises optical communications.

1 7. A shopping system comprising a central computer coupled to a wireless
2 communications network having access points, a plurality of portable shopping terminals
3 communicating with said central computer using said communications network according
4 to a first high data rate protocol and a plurality of electronic shelf labels communicating
5 with said central computer using said communications network according to a second low
6 data rate protocol.

1 8. A system according to claim 7 wherein said portable shopping
2 terminals are arranged to communicate with electronic shelf labels.

1 9. A method of recording purchases by a customer using a self-service
2 terminal, comprising:

3 associating electronic shelf labels with items to be purchased;

4 providing data communications from said shelf labels to said self-service
5 terminals, said data representing an item to be purchased; and

1 accumulating a list of items represented by data communicated to said
2 self-service terminal.

1 10. A method as specified in claim 9 further comprising communicating
2 said data representing items to be purchased from said self-service terminal to a central
3 computer and wherein said list of items is accumulated in said central computer.

1 11. A method according to claim 9, further comprising communicating
2 data from said central computer to said electronic shelf labels.

1 12. A method according to claim 11, wherein a first data communications
2 protocol is used for communications from said self-service terminal to said central
3 computer and a second data communications protocol is used for communications from
4 said central computer to said electronic shelf labels.

1 13. A method as specified in claim 9 wherein said list of items is
2 accumulated in said self-service terminal comprising the further step of displaying said
3 list to said customers.

1 14. A self-service shopping system comprising a data communication
2 network having a central computer, a plurality of electronic shelf labels, each
3 communicating with said central computer and receiving price representative data

therefrom, and a plurality of self-service shopping terminals, said terminals communicating purchase data to said shelf labels in response to activation thereof by a customer, said shelf labels relaying said purchase data to said central computer, and wherein said central computer records purchases by said customer in response to said data.

15. A shopping system in accordance with claim 14 wherein said self-service shopping terminals communicate purchase data comprising shopping terminal identification data.

16. A shopping system in accordance with claim 14 wherein said communication from said terminals to said shelf labels comprises short range radio communication.

17. A shopping system in accordance with claim 14 wherein said communication from said terminals to said shelf labels comprises optical communications.

18. A shopping system in accordance with claim 17 where communications comprises infrared communication.

1 19. A method of recording purchases by a customer using a self-service
2 terminal, comprising:
3 associating electronic shelf labels with items to be purchased;
4 providing data communication from said shopping terminals to
5 said electronic shelf labels representing purchase by a customer associated with said
6 shopping terminal of items associated with said shelf labels;
7 communicating said purchase representative data from said shelf
8 labels to a central computer, and
9 accumulating in said central computer a list of purchases
10 associated with said customer.

1 20. A method in accordance with claim 19 wherein said data
2 communications from said shopping terminals to said shelf labels comprise short range
3 radio communications.

1 21. A method in accordance with claim 19 wherein said data
2 communications from said shopping terminals to said shelf labels comprise optical
3 communications.

1 22. A method in accordance with claim 21 wherein said optical
2 communications comprise infrared communications.

23. In a system for self-service shopping, wherein a shopper is associated with a shopping terminal for entering data associated with items to be purchased, an item return station, comprising:

- a communication module for receiving terminal identification data;
- a display for displaying an itemized list of purchases entered using said terminal; and
- data entry means for designating items to be deleted from said itemized list.

24. An electronic shelf label, for use in conjunction with an electronic self-service shopping system, comprising;

- a shelf label memory for storing price data;
- a shelf label display for displaying said price data stored in said memory; and
- a data communications module arranged for providing data communications with a central computer to receive price data to be stored and for providing short range data communications with a self-service shopping terminal.

25. In a self-service shopping system having portable terminals for use by customers to generate a record of items to be purchased, apparatus for recording deletion of articles from said record, comprising a return station having a display and a communication unit for receiving data from said portable terminal, said return station

5 being in data communication with a central computer maintaining said record of items
6 and in data communication with said portable terminal, said return station being arranged
7 to receive identification data from said portable terminal, to receive said records of items
8 from said central computer, to display said record on said display and to receive article
9 deletion commands from said customer.

1 26. Apparatus as specified in claim 25 wherein said return station includes
2 control keys, and wherein said control keys receive said article deletion commands.

1 27. Apparatus as specified in claim 25 wherein said return station is
2 arranged to receive article deletion commands as data communications from said portable
3 terminal.

1 28. A portable self-service shopping terminal comprising a programmed
2 processor and a wireless data communications module, said data communications module
3 being arranged to communicate with a central computer over a wireless data
4 communications network and to provide short range communications with an electronic
5 shelf label.

1 29. A portable shelf-service shopping terminal as specified in claim 28
2 wherein said data communications module is arranged to communicate with said central

3 computer using a first, high data rate protocol and to communicate with said electronic
4 shelf label using a second, low data rate protocol.

1 30. A system for distributing product information for a plurality of items
2 which are available for customer selection, said system comprising:

3 a) a central computer having access to database of product information for
4 each of the plurality of items, and a communication interface for transmitting at
5 least a portion of said product information to a remote address;

6 b) plurality of electronic shelf labels for displaying a portion of the
7 product information for at least one associated item available for selection
8 by a customer, each of said electronic shelf labels having a unique address and
9 including a communication interface for receiving said portion of the product
0 information; and

1 c) at least one terminal device, arranged for data communications
2 with the electronic shelf labels, for use by a customer for generating an
3 itemized list of the items selected by the customer;

4 whereby said itemized list of products selected by the customer is
5 generated and stored on a memory.

6 31. The system of claim 30 further comprising a cashier terminal for
7 collecting the itemized list of items selected by the customer from the memory and for
8 receiving payment for such items.

32. The system of claim 30 wherein the itemized list is stored on a memory of the terminal and transmitted from the terminal to the central computer through a long range communication interface.

33. The system of claim 32 wherein the communication interface is a spread spectrum wireless network.

34. The system of claim 32 wherein the communication interface comprises a cradle in communication with the central computer for receiving the terminal, reading the memory of said terminal and communicating data to the central computer.

35. The system of claim 30 wherein the plurality of electronic shelf labels comprises a plurality of radio frequency identification tags.

36. The system of claim 30 wherein the electronic shelf labels include a display, a memory, and mechanical mounting means for mounting said display in the vicinity of the at least one item associated with said shelf label.

37. The system of claim 36 wherein the electronic shelf labels further includes a data processor, a battery and a reset button for resetting the data processor to

an initial start up routine, wherein the label displays a condition that no data is currently available or that the relevant information is in the process of being retrieved.

- 5 38. A self-service shopping system comprising a plurality of electronic shelf labels, each having a communications module for providing data communication with a central computer for receiving pricing information therefrom, and for providing short-range data communications, and a portable shopping terminal for receiving short range communications of data representing articles to be purchased from said electronic shelf label in response to activation of said portable terminal by a customer.
- 10 39. A self-service shopping system substantially as specifically described herein with reference to the accompanying drawings.
- 15 40. A method of recording purchases substantially as specifically described herein with reference to the accompanying drawings.
41. A portable self-service shopping terminal substantially as specifically described herein with reference to the accompanying drawings.
- 20 42. A system for distributing product information substantially as specifically described herein with reference to the accompanying drawings.
43. A shopping system substantially as specifically described herein with reference to the accompanying drawings.
- 25 44. An electronic shelf label substantially as specifically described herein with reference to the accompanying drawings.



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Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.R): H4L (LDA, LDLX, LCAX, LCX), H4B (BK22)

Int Cl (Ed.7): G06F 17/60, H04B 10/22

Other: Online: WPI, JAPIO, EPODOC

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A, P	US 5880449 (TEICHER ET AL) see whole document	-
A	US 5468942 (OOSTERVEEN ET AL) see whole document	-

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.